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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/039,508	11/09/2001	Kunal N. Taravade	01-719	8909
24319	7590	10/06/2003	EXAMINER	
LSI LOGIC CORPORATION 1621 BARBER LANE MS: D-106 LEGAL MILPITAS, CA 95035			BARRECA, NICOLE M	
			ART UNIT	PAPER NUMBER
			1756	

DATE MAILED: 10/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/039,508

Applicant(s)

TARAVADE ET AL.

Examiner

Nicole M. Barreca

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 7-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

1. Applicant's election with traverse of Group I, claims 1-6 in Paper No. 4 is acknowledged. The traversal is on the ground(s) that there is no serious burden on the examiner to search all four groups of claims. This is not found persuasive because the inventions of Groups I, II, III and IV are distinct and have acquired separate status in the art because of their divergent subject matter. The search required for Group I is not required for Groups II, III and IV. The claims of Group I are directed to a phase shift mask requiring that the refractive index of the phase shift layer is nonlinear and changes with the intensity of the incident light beam. The claims of Group II are directed to a method for making a phase shift mask that has no limitations directed to the refractive index of the phase shift layer and only require that the transmission of the mask depend in part on the intensity of the incident light beam. The claims of Group III are directed to a method for manufacturing an integrated circuit requiring that the intensity of incident light is adjusted when the photoresist is exposed. The claims of Group IV are directed to an integrated circuit whose only product limitation is that feature size is smaller than the wavelength of incident light. In addition each individual search encompasses not only the subclass that the invention is classified in, but also numerous other subclasses.

The applicant also claims that restricting the application places an undue financial burden on the applicant. This argument is not found persuasive because the MPEP does not provide for a connection between applicant's financial issues and criteria for a proper restriction requirement. According to the MPEP 803 there are two criteria for a proper restriction requirement between patently distinct inventions, (1) the

inventions must be independent or distinct as claimed and (2) there must be a serious burden on the examiner if the restriction is not required. With both of the criteria having been met, the requirement is still deemed proper and is therefore made FINAL.

2. Claims 7-20 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 4.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 2, and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Lawandy (US 5,670,280).
5. Lawandy discloses a phase mask made of nonlinear material. The nonlinear phase shift mask (NPSM) 24 which includes a thick fused silicon diffractive phase mask (PM) 26 (corresponding to the applicant's mask substrate) which is combined with semiconductor doped glass (SDG) 28, which has at least one intensity dependent optical characteristics (applicant's phase shift layer). Suitable semiconductor doped

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(CdSxSei-x containing) glasses may be used for the SDG. The refractive index profile is expected to be approximately Gaussian, thus mirroring the input beam. While Fig.1 illustrates a single layer on a substrate, a pattern, such as a circuit pattern, may be etched into the substrate directly or into one or more deposited film layers. Other suitable materials, such as polymers, crystals and other types of glasses may also be used instead of SDG to provide the intensity dependent nonlinearity. See col.2, 48-67, col.3, 26-67, col.6, 51-63.

6. Claims 1, 2, 4 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Smith (US 5,939,227).

7. Smith discloses a multilayered attenuated phase shift mask. Fig. 1 illustrates the attenuated phase shift mask 10 including substrate 12. Substrate 12 may be formed of fused silica, quartz, fluorides or other glasses. The mask also includes first layer 13 and third layer 18 of silicon nitride and second layer 16 and fourth layer 20 of tantalum nitride. The order of the SiN and TaN may be switched. In addition any group IV, V or VI transitional metal nitride may be used (col.3, 49-col.4, 25). Figure 2 A illustrates the nonlinear dependence of the refractive index on the wavelength of light for the phase shift mask in Fig.1.

8. Claims 1, 2, and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Mason (US 6,436,588).

9. Mason discloses a phase shift mask with variable transmission. Mask 14 comprises a variable transmission material, such as lithium niobate, lithium tantalite or other suitable variable transmission material including Pockels- and Kerr-type materials.

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The transparent substrate 16 may comprise glass, quartz or other suitable transparent material (col.3, 42-65).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mason as applied to claim 1 above, and further in view of Dodge (US 5,592,325).

12. The teachings of Mason have been discussed above. Mason teaches an attenuating phase shift mask that has a variable transmission and that attenuated phase shift masks comprise a material such as MoSi which allows about 5-12% of the light provided to pass through (col.3, 18-24). The reference does not disclose that the variable transmission layer (first phase shift layer) comprises potassium titanyl phosphate (KTP) or rubidium titanyl phosphate. Mason, however, does teach that the attenuated phase shift mask 14 of the invention comprises a variable transmission material including Pockels- and Kerr- type materials. Dodge teaches that KTP is a known Pockel material which has nonlinear characteristics (col.5, 9-18). It would have been obvious to one of ordinary skill in the art to use KTP as the Pockel material for the variable transmission layer in the attenuating phase shift mask of Mason because Dodge teaches that KTP is a known Pockel material with nonlinear characteristics.

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Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole M. Barreca whose telephone number is 703-308-7968. The examiner can normally be reached on Monday-Thursday (8:00 am-6: 30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 703-308-2464. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



Nicole Barreca
Patent Examiner
Art Unit 1756

9/25/03